SEQUENCE LISTING

<110> Helmholtz-Institut fuer Infektionsforschung GmbH
Ferrer, Manuel
Chernikova, Tatjana
Golyshin, Peter
Timmis, Kenneth
Yakimov, Michail

<120> Transgenic organisms with lower growth temperatures

<130> FERRER ET AL-1

<150> EP 03023032.0
<151> 2003-10-13

<160> 28

<170> PatentIn version 3.5

<210> 1
<211> 97
<212> PRT
<213> artificial sequence

<220>
<223> Cpn10 of Oleispira antarctica

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Glu Glu Thr Ala Thr Ala Gly Gly Ile Ile Leu Pro Gly Ala Ala Ala
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Glu Lys Pro Asn Gln Gly Val Val Ile Ser Val Gly Thr Gly Arg Ile
35 40 45

Leu Asp Asn Gly Ser Val Gln Ala Leu Ala Val Asn Glu Gly Asp Val
50 55 60

Val Val Phe Gly Lys Tyr Ser Gly Gln Asn Thr Ile Asp Ile Asp Gly
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Glu Glu Leu Leu Ile Leu Asn Glu Ser Asp Ile Tyr Gly Val Leu Glu
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20 25 30

Pro Lys Gly Arg Asn Val Val Ile Glu Lys Ser Phe Gly Ala Pro Ile
35 40 45

Ile Thr Lys Asp Gly Val Ser Val Ala Arg Glu Ile Glu Leu Lys Asp
50 55 60

Lys Phe Glu Asn Met Gly Ala Gln Met Val Lys Glu Val Ala Ser Gln
65 70 75 80

Ala Asn Asp Gln Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala
85 90 95

Gln Ala Ile Ile Ser Glu Gly Leu Lys Ser Val Ala Ala Gly Met Asn
100 105 110

Pro Met Asp Leu Lys Arg Gly Ile Asp Lys Ala Thr Ala Ala Val Val
115 120 125

Ala Ala Ile Lys Glu Gln Ala Gln Pro Cys Leu Asp Thr Lys Ala Ile
130 135 140

Ala Gln Val Gly Thr Ile Ser Ala Asn Ala Asp Glu Thr Val Gly Arg
145 150 155 160

Leu Ile Ala Glu Ala Met Glu Lys Val Gly Lys Glu Gly Val Ile Thr
165 170 175

Val Glu Glu Gly Lys Gly Leu Glu Asp Glu Leu Asp Val Val Glu Gly
180 185 190

Met Gln Phe Asp Arg Gly Tyr Leu Ser Pro Tyr Phe Ile Asn Asn Gln
195 200 205

Glu Lys Met Thr Val Glu Met Glu Asn Pro Leu Ile Leu Leu Val Asp
210 215 220

Lys Lys Ile Asp Asn Leu Gln Glu Leu Leu Pro Ile Leu Glu Asn Val
225 230 235 240

Ala Lys Ser Gly Arg Pro Leu Leu Ile Val Ala Glu Asp Val Glu Gly
245 250 255

Gln Ala Leu Ala Thr Leu Val Val Asn Asn Leu Arg Gly Thr Phe Lys
260 265 270

Val Ala Ala Val Lys Ala Pro Gly Phe Gly Asp Arg Arg Lys Ala Met
275 280 285

Leu Gln Asp Leu Ala Ile Leu Thr Gly Gly Gln Val Ile Ser Glu Glu
290 295 300

Leu Gly Met Ser Leu Glu Thr Ala Asp Pro Ser Ser Leu Gly Thr Ala
305 310 315 320

Ser Lys Val Val Ile Asp Lys Glu Asn Thr Val Ile Val Asp Gly Ala
325 330 335

Gly Thr Glu Ala Ser Val Asn Thr Arg Val Asp Gln Ile Arg Ala Glu
340 345 350

Ile Glu Ser Ser Thr Ser Asp Tyr Asp Ile Glu Lys Leu Gln Glu Arg
355 360 365

Val Ala Lys Leu Ala Gly Gly Val Ala Val Ile Lys Val Gly Ala Gly
370 375 380

Ser Glu Met Glu Met Lys Glu Lys Lys Asp Arg Val Asp Asp Ala Leu
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His Ala Thr Arg Ala Ala Val Glu Glu Gly Val Val Ala Gly Gly Gly
405 410 415

Val Ala Leu Ile Arg Ala Leu Ser Ser Val Thr Val Val Gly Asp Asn
420 425 430

Glu Asp Gln Asn Val Gly Ile Ala Leu Ala Leu Arg Ala Met Glu Ala
435 440 445

Pro Ile Arg Gln Ile Ala Gly Asn Ala Gly Ala Glu Gly Ser Val Val
450 455 460

Val Asp Lys Val Lys Ser Gly Thr Gly Ser Phe Gly Phe Asn Ala Ser
465 470 475 480

Thr Gly Glu Tyr Gly Asp Met Ile Ala Met Gly Ile Leu Asp Pro Ala

485 490 495

Lys Val Thr Arg Ser Ser Leu Gln Ala Ala Ala Ser Ile Ala Gly Leu
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Met Ile Thr Thr Glu Ala Met Val Ala Asp Ala Pro Val Glu Glu Gly
515 520 525

Ala Gly Gly Met Pro Asp Met Gly Gly Met Gly Gly Met Gly Gly Met
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Pro Gly Met Met
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<210> 3
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<213> Oleispira antarctica

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            20                  25                  30

Thr Thr Gln Gln Asp Asn Leu Tyr Thr Gly Val Met Ser Leu Ala Arg
        35                  40                  45

Asp Ser Ala Gly Leu Glu Val Lys Thr Ala Ser Ala Gly Asp Val Asn
    50                  55                  60

Leu Thr Tyr Met Glu Arg Gln Gly Ser Asp Lys Asp Asn Ala Glu Ser
65                  70                  75                  80

Val Ile Leu Leu His Gly Phe Ser Ala Asp Lys Asp Asn Trp Ile Leu
                85                  90                  95

Phe Thr Lys Glu Phe Asp Glu Lys Tyr His Val Ile Ala Val Asp Leu
            100                 105                 110

Ala Gly His Gly Asp Ser Glu Gln Leu Leu Thr Thr Asp Tyr Gly Leu
        115                 120                 125

Ile Lys Gln Ala Glu Arg Leu Asp Ile Phe Leu Ser Gly Leu Gly Val
    130                 135                 140

Asn Ser Phe His Ile Ala Gly Asn Ser Met Gly Gly Ala Ile Ser Ala
145                 150                 155                 160

Ile Tyr Ser Leu Ser His Pro Glu Lys Val Lys Ser Leu Thr Leu Ile
                165                 170                 175

Asp Ala Ala Gly Val Asp Gly Asp Thr Glu Ser Glu Tyr Tyr Lys Val
            180                 185                 190

Leu Ala Glu Gly Lys Asn Pro Leu Ile Ala Thr Asp Glu Ala Ser Phe
        195                 200                 205

Glu Tyr Arg Met Gly Phe Thr Met Thr Gln Pro Pro Phe Leu Pro Trp
    210                 215                 220

Pro Leu Arg Pro Ser Leu Leu Arg Lys Thr Leu Ala Arg Ala Glu Ile
225                 230                 235                 240

Asn Asn Lys Ile Phe Ser Asp Met Leu Lys Thr Lys Glu Arg Leu Gly
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Met Thr Asn Phe Gln Gln Lys Ile Glu Val Lys Met Ala Gln His Pro
260 265 270

Leu Pro Thr Leu Ile Met Trp Gly Lys Glu Asp Arg Val Leu Asp Val
275 280 285

Ser Ala Ala Ala Ala Phe Lys Lys Ile Ile Pro Gln Ala Thr Val His
290 295 300

Ile Phe Pro Glu Val Gly His Leu Pro Met Val Glu Ile Pro Ser Glu
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Ser Ala Lys Val Tyr Glu Glu Phe Leu Ser Ser Ile Lys
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<211> 3939
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<220>
<223> DNA fragment from plasmid pBK1Est coding for esterase of Oleispira antarctica

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tctgctagca ccgatttttc taatagcgca gcttctttta tttctgaacg ggcaactgat 240

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actgttcata ttacaatcat agtacaggct agaggcccaa aattgcagct gatattcacc 360

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acccgtagcg gaaaaattca gcaaatagcc aaagaaaacg attggcaata ccaagaattc 480

atcgattttg atgatgacat taagcaggca aactttggcc tattaaacta cagtcaaaat 540

gcaattttta gacatctcat tcaagcaact gacgaacact atggcttagc gtttaagacc 600

tttgactgtc gagcgttaga accttcaggt attcacaata gcagtcttat tttatttacc 660

ctcgcactaa agactgaatt caataaccta cacatttgct taagtcgaca tattcaagat 720

aaagatgcct tcactgacat cagtcaccaa caatcaatca aacaccaata ccaatcgcaa 780

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<213> artificial sequence

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<223> cpn10 of oleispira antarctica

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20 25 30

Glu Lys Pro Asn Gln Gly Val Val Ile Ser Val Gly Thr Gly Arg Ile
35 40 45

Leu Asp Asn Gly Ser Val Gln Ala Leu Ala Val Asn Glu Gly Asp Val
50 55 60

Val Val Phe Gly Lys Tyr Ser Gly Gln Asn Thr Ile Asp Ile Asp Gly
65 70 75 80

Glu Glu Leu Leu Ile Leu Asn Glu Ser Asp Ile Tyr Gly Val Leu Glu
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Ala

<210> 7
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<212> PRT
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<223> Cpn10 of oleispira antarctica

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20 25 30

Pro Lys Gly Arg Asn Val Val Ile Glu Lys Ser Phe Gly Ala Pro Ile
35 40 45

Ile Thr Lys Asp Gly Val Ser Val Ala Arg Glu Ile Glu Leu Lys Asp
50 55 60

Lys Phe Glu Asn Met Gly Ala Gln Met Val Lys Glu Val Ala Ser Gln
65 70 75 80

Ala Asn Asp Gln Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala
85 90 95

Gln Ala Ile Ile Ser Glu Gly Leu Lys Ser Val Ala Ala Gly Met Asn
100 105 110

Pro Met Asp Leu Lys Arg Gly Ile Asp Lys Ala Thr Ala Ala Val Val
115 120 125

Ala Ala Ile Lys Glu Gln Ala Gln Pro Cys Leu Asp Thr Lys Ala Ile
130 135 140

Ala Gln Val Gly Thr Ile Ser Ala Asn Ala Asp Glu Thr Val Gly Arg
145 150 155 160

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Leu Ile Ala Glu Ala Met Glu Lys Val Gly Lys Glu Gly Val Ile Thr
                  165                 170                 175

Val Glu Glu Gly Lys Gly Leu Glu Asp Glu Leu Asp Val Val Glu Gly
            180                 185                 190

Met Gln Phe Asp Arg Gly Tyr Leu Ser Pro Tyr Phe Ile Asn Asn Gln
        195                 200                 205

Glu Lys Met Thr Val Glu Met Glu Asn Pro Leu Ile Leu Leu Val Asp
    210                 215                 220

Lys Lys Ile Asp Asn Leu Gln Glu Leu Leu Pro Ile Leu Glu Asn Val
225                 230                 235                 240

Ala Lys Ser Gly Arg Pro Leu Leu Ile Val Ala Glu Asp Val Glu Gly
                245                 250                 255

Gln Ala Leu Ala Thr Leu Val Val Asn Asn Leu Arg Gly Thr Phe Lys
            260                 265                 270

Val Ala Ala Val Lys Ala Pro Gly Phe Gly Asp Arg Arg Lys Ala Met
        275                 280                 285

Leu Gln Asp Leu Ala Ile Leu Thr Gly Gly Gln Val Ile Ser Glu Glu
    290                 295                 300

Leu Gly Met Ser Leu Glu Thr Ala Asp Pro Ser Ser Leu Gly Thr Ala
305                 310                 315                 320

Ser Lys Val Val Ile Asp Lys Glu Asn Thr Val Ile Val Asp Gly Ala
                325                 330                 335

Gly Thr Glu Ala Ser Val Asn Thr Arg Val Asp Gln Ile Arg Ala Glu
            340                 345                 350

Ile Glu Ser Ser Thr Ser Asp Tyr Asp Ile Glu Lys Leu Gln Glu Arg
        355                 360                 365

Val Ala Lys Leu Ala Gly Gly Val Ala Val Ile Lys Val Gly Ala Gly
    370                 375                 380

Ser Glu Met Glu Met Lys Glu Lys Lys Asp Arg Val Asp Asp Ala Leu
385                 390                 395                 400

His Ala Thr Arg Ala Ala Val Glu Glu Gly Val Val Ala Gly Gly Gly
                405                 410                 415
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Val Ala Leu Ile Arg Ala Leu Ser Ser Val Thr Val Val Gly Asp Asn
420 425 430

Glu Asp Gln Asn Val Gly Ile Ala Leu Ala Leu Arg Ala Met Glu Ala
435 440 445

Pro Ile Arg Gln Ile Ala Gly Asn Ala Gly Ala Glu Gly Ser Val Val
450 455 460

Val Asp Lys Val Lys Ser Gly Thr Gly Ser Phe Gly Phe Asn Ala Ser
465 470 475 480

Thr Gly Glu Tyr Gly Asp Met Ile Ala Met Gly Ile Leu Asp Pro Ala
485 490 495

Lys Val Thr Arg Ser Ser Leu Gln Ala Ala Ala Ser Ile Ala Gly Leu
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Met Ile Thr Thr Glu Ala Met Val Ala Asp Ala Pro Val Glu Glu Gly
515 520 525

Ala Gly Gly Met Pro Asp Met Gly Gly Met Gly Gly Met Gly Gly Met
530 535 540

Pro Gly Met Met
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<212> PRT
<213> Oleispira antarctica

<400> 8

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Gly Thr Gly Ala Leu Ile Ile Ser Ser Leu Phe Phe Gly Gly Cys Thr
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Thr Thr Gln Gln Asp Asn Leu Tyr Thr Gly Val Met Ser Leu Ala Arg
35 40 45

Asp Ser Ala Gly Leu Glu Val Lys Thr Ala Ser Ala Gly Asp Val Asn
50 55 60

Leu Thr Tyr Met Glu Arg Gln Gly Ser Asp Lys Asp Asn Ala Glu Ser
65 70 75 80

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Val Ile Leu Leu His Gly Phe Ser Ala Asp Lys Asp Asn Trp Ile Leu
                 85                  90                  95

Phe Thr Lys Glu Phe Asp Glu Lys Tyr His Val Ile Ala Val Asp Leu
            100                 105                 110

Ala Gly His Gly Asp Ser Glu Gln Leu Leu Thr Thr Asp Tyr Gly Leu
        115                 120                 125

Ile Lys Gln Ala Glu Arg Leu Asp Ile Phe Leu Ser Gly Leu Gly Val
    130                 135                 140

Asn Ser Phe His Ile Ala Gly Asn Ser Met Gly Gly Ala Ile Ser Ala
145                 150                 155                 160

Ile Tyr Ser Leu Ser His Pro Glu Lys Val Lys Ser Leu Thr Leu Ile
                165                 170                 175

Asp Ala Ala Gly Val Asp Gly Asp Thr Glu Ser Glu Tyr Tyr Lys Val
            180                 185                 190

Leu Ala Glu Gly Lys Asn Pro Leu Ile Ala Thr Asp Glu Ala Ser Phe
        195                 200                 205

Glu Tyr Arg Met Gly Phe Thr Met Thr Gln Pro Pro Phe Leu Pro Trp
    210                 215                 220

Pro Leu Arg Pro Ser Leu Leu Arg Lys Thr Leu Ala Arg Ala Glu Ile
225                 230                 235                 240

Asn Asn Lys Ile Phe Ser Asp Met Leu Lys Thr Lys Glu Arg Leu Gly
                245                 250                 255

Met Thr Asn Phe Gln Gln Lys Ile Glu Val Lys Met Ala Gln His Pro
            260                 265                 270

Leu Pro Thr Leu Ile Met Trp Gly Lys Glu Asp Arg Val Leu Asp Val
        275                 280                 285

Ser Ala Ala Ala Ala Phe Lys Lys Ile Ile Pro Gln Ala Thr Val His
    290                 295                 300

Ile Phe Pro Glu Val Gly His Leu Pro Met Val Glu Ile Pro Ser Glu
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Ser Ala Lys Val Tyr Glu Glu Phe Leu Ser Ser Ile Lys
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325 330

<210> 9
<211> 5373
<212> DNA
<213> artificial sequence

<220>
<223> fusion of native chaperonin-coding fragments with esterase of Oleispira antarctica

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Leu Asp Asn Gly Ser Val Gln Ala Leu Ala Val Asn Glu Gly Asp Val
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cccatcgatt ttccacccgg gtggggtacc aggtaagtgt acccaattcg ccctatagtg 5340

agtcgtatta caattcactg gccgtcgttt tac 5373

<210> 14
<211> 97
<212> PRT
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<220>
<223> Cpn10 of oleispira antarctica, nucleotides 458 - 751

<400> 14

Met Lys Ile Arg Pro Leu His Asp Arg Ile Val Val Arg Arg Lys Glu
1 5 10 15

Glu Glu Thr Ala Thr Ala Gly Gly Ile Ile Leu Pro Gly Ala Ala Ala
20 25 30

Glu Lys Pro Asn Gln Gly Val Val Ile Ser Val Gly Thr Gly Arg Ile
35 40 45

Leu Asp Asn Gly Ser Val Gln Ala Leu Ala Val Asn Glu Gly Asp Val
50 55 60

Val Val Phe Gly Lys Tyr Ser Gly Gln Asn Thr Ile Asp Ile Asp Gly
65 70 75 80

Glu Glu Leu Leu Ile Leu Asn Glu Ser Asp Ile Tyr Gly Val Leu Glu
85 90 95

Ala

<210> 15
<211> 548
<212> PRT
<213> artificial sequence

<220>
<223> Cpn60 of oleispira antarctica, nucleotides 458 - 751

<400> 15

Met Ala Ala Lys Asp Val Leu Phe Gly Asp Ser Ala Arg Ala Lys Met
1 5 10 15

Leu Val Gly Val Asn Ile Leu Ala Asp Ala Val Arg Val Thr Leu Gly
20 25 30

Pro Lys Gly Arg Asn Val Val Ile Glu Lys Ser Phe Gly Ala Pro Ile
35 40 45

Ile Thr Lys Asp Gly Val Ser Val Ala Arg Glu Ile Glu Leu Lys Asp
50 55 60

Lys Phe Glu Asn Met Gly Ala Gln Met Val Lys Glu Val Ala Ser Gln
65 70 75 80

Ala Asn Asp Gln Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala
85 90 95

Gln Ala Ile Ile Ser Glu Gly Leu Lys Ser Val Ala Ala Gly Met Asn
100 105 110

Pro Met Asp Leu Lys Arg Gly Ile Asp Lys Ala Thr Ala Ala Val Val
115 120 125

Ala Ala Ile Lys Glu Gln Ala Gln Pro Cys Leu Asp Thr Lys Ala Ile
130 135 140

Ala Gln Val Gly Thr Ile Ser Ala Asn Ala Asp Glu Thr Val Gly Arg
145 150 155 160

Leu Ile Ala Glu Ala Met Glu Lys Val Gly Lys Glu Gly Val Ile Thr
165 170 175

Val Glu Glu Gly Lys Gly Leu Glu Asp Glu Leu Asp Val Val Glu Gly

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                180                 185                 190

Met Gln Phe Asp Arg Gly Tyr Leu Ser Pro Tyr Phe Ile Asn Asn Gln
        195                 200                 205

Glu Lys Met Thr Val Glu Met Glu Asn Pro Leu Ile Leu Leu Val Asp
    210                 215                 220

Lys Lys Ile Asp Asn Leu Gln Glu Leu Leu Pro Ile Leu Glu Asn Val
225                 230                 235                 240

Ala Lys Ser Gly Arg Pro Leu Leu Ile Val Ala Glu Asp Val Glu Gly
                245                 250                 255

Gln Ala Leu Ala Thr Leu Val Val Asn Asn Leu Arg Gly Thr Phe Lys
            260                 265                 270

Val Ala Ala Val Lys Ala Pro Gly Phe Gly Asp Arg Arg Lys Ala Met
        275                 280                 285

Leu Gln Asp Leu Ala Ile Leu Thr Gly Gly Gln Val Ile Ser Glu Glu
    290                 295                 300

Leu Gly Met Ser Leu Glu Thr Ala Asp Pro Ser Ser Leu Gly Thr Ala
305                 310                 315                 320

Ser Lys Val Val Ile Asp Lys Glu Asn Thr Val Ile Val Asp Gly Ala
                325                 330                 335

Gly Thr Glu Ala Ser Val Asn Thr Arg Val Asp Gln Ile Arg Ala Glu
            340                 345                 350

Ile Glu Ser Ser Thr Ser Asp Tyr Asp Ile Glu Lys Leu Gln Glu Arg
        355                 360                 365

Val Ala Lys Leu Ala Gly Gly Val Ala Val Ile Lys Val Gly Ala Gly
    370                 375                 380

Ser Glu Met Glu Met Lys Glu Lys Lys Asp Arg Val Asp Asp Ala Leu
385                 390                 395                 400

His Ala Thr Arg Ala Ala Val Glu Glu Gly Val Val Ala Gly Gly Gly
                405                 410                 415

Val Ala Leu Ile Arg Ala Leu Ser Ser Val Thr Val Val Gly Asp Asn
            420                 425                 430
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Glu Asp Gln Asn Val Gly Ile Ala Leu Ala Leu Arg Ala Met Glu Ala
435 440 445

Pro Ile Arg Gln Ile Ala Gly Asn Ala Gly Ala Ala Gly Ala Ala Val
450 455 460

Val Asp Lys Val Lys Ser Gly Thr Gly Ser Phe Gly Phe Asn Ala Ser
465 470 475 480

Thr Gly Glu Tyr Gly Asp Met Ile Ala Met Gly Ile Leu Asp Pro Ala
485 490 495

Lys Val Thr Arg Ser Ser Leu Gln Ala Ala Ala Ser Ile Ala Gly Leu
500 505 510

Met Ile Thr Thr Glu Ala Met Val Ala Asp Ala Pro Val Glu Glu Gly
515 520 525

Ala Gly Gly Met Pro Asp Met Gly Gly Met Gly Gly Met Gly Gly Met
530 535 540

Pro Gly Met Met
545

<210> 16
<211> 2783
<212> DNA
<213> artificial sequence

<220>
<223> coding sequence encoding mutant protein

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cactggccgg cgctttatta ttaacgccgg gttttgtcac tgatgcgctg ggttttacat 120

tactcgtccc cgcgacgcgt aaagcgttgg tccataaggt gattgcattt attaccctc 180

gcatgatgac tgcaagcagc tttcaagcga cgggtagttt tcaggaaggc tcgtttaaag 240

atgtacattc gcacactgac tcgcaaagca gtcatgaaaa aatcacaatt gaaggcgaat 300

ataccaaaga cgataagtag gtatttttc ggctagccgt tgaaatccta gtaaaagccc 360

cgataaatta accatctatt tttcacagag gcaatttagc ctttgtttac cttattgatc 420

ctaatacttg ggatccaaca gttggagagt ctagcaaatg aaaatccgtc cattacatga 480

tcgtattgtt gttcgccgta aagaagaaga gaccgcaact gcgggtggta ttattttacc 540

gggcgctgcg gcagaaaaac caaatcaagg tgttgttatc tctgtgggta ctggccgtat 600

tcttgataat ggttcagtgc aagcgctggc ggttaacgaa ggcgatgttg tcgttttgg 660

taaatactca ggtcaaaata ctatcgatat cgatggtgaa gaattattga ttttgaatga 720

aagtgatatc tacggcgttt tagaagctta attattacac tcacttttt atttaaccta 780

caaaatttaa ggaaagatca tggctgctaa agacgtatta tttggtgata gcgcacgcgc 840

aaaaatgttg gtaggtgtaa acattttagc cgacgcagta agagttacct taggacctaa 900

aggtcgtaac gttgttatag aaaaatcatt tggtgcaccg atcatcacca aagatggtgt 960

ttctgttgcg cgtgaaatcg aattgaaaga caaattcgaa aacatgggcg cacagatggt 1020

taaggaagtt gcttctcaag ccaacgacca agccggtgac ggcacaacga cagcgactgt 1080

actagcacag gcgattatca gcgaaggctt gaaatctgtt gcggctggca tgaatccaat 1140

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cgatgaaacg gttggtcgtt taattgctga agcgatggaa aaagtcggta aagaaggtgt 1320

gattaccgtt gaagaaggca aaggccttga agacgagctt gatgttgtag aaggcatgca 1380

gttcgatcgc ggttacttgt ctccgtactt catcaacaac caagaaaaaa tgaccgtaga 1440

aatggaaaat ccattaattc tattggttga taagaaaatt gataaccttc aagagctgtt 1500

gccaattctt gaaaacgtcg ctaaatcagg tcgtccatta ttgatcgttg ctgaagatgt 1560

tgaaggccaa gcactagcaa cattggtagt aaacaacttg cgcggcacat tcaaggttgc 1620

agcggttaaa gcccctggtt ttggcgatcg tcgtaaagcg atgttgcaag atcttgccat 1680

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gggtaacgca ggtgctgcag gggcagcggt tgttgataaa gtgaaatctg gcacaggtag 2220

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ccctgcaaaa gtcacgcgtt catctctaca agccgcggcg tctatcgcag gtttgatgat 2340

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<211> 22
<212> DNA
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<220>
<223> Forward Primer

<220>
<221> misc_feature
<222> (1)..(22)
<223> "n" defines inosine

<400> 17
gcngcnggna tgaayccnat gg 22

<210> 18
<211> 23
<212> DNA
<213> artificial sequence

<220>
<223> Reverse Primer

<220>
<221> misc_feature
<222> (1)..(23)
<223> residue "n" designates inosine

<400> 18
ccnccnccng cnacnacncc ytc 23

<210> 19
<211> 13
<212> PRT
<213> Oleispira antarctica

<400> 19

Ser Val Ala Ala Gly Met Asn Pro Met Asp Leu Gln Arg
1 5 10

<210> 20
<211> 16
<212> PRT
<213> Oleispira antarctica

<400> 20

Val Glu Glu Gly Val Val Ala Gly Gly Gly Val Ala Ala Leu Leu Arg
1 5 10 15

<210> 21
<211> 42
<212> DNA
<213> artificial sequence

<220>
<223> Oligonucleotide

<400> 21
ggtggtcagt ggttgttgtt gatacagtga aatctggcac ag 42

<210> 22
<211> 37
<212> DNA
<213> artificial sequence

<220>
<223> Oligonucleotide

<400> 22
cctgtgccag atttcactgt atcaacaacc actgacc 37

<210> 23
<211> 30
<212> DNA
<213> artificial sequence

<220>
<223> Oligonucleotide

<400> 23
ggtgataaag tgaaaggtgg cacaggtagc 30

<210> 24
<211> 30
<212> DNA
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<220>
<223> Oligonucleotide

<400> 24
gctacctgtg ccacctttca ctttatcaac 30

<210> 25
<211> 46
<212> DNA
<213> artificial sequence

<220>
<223> Oligonucleotide

<400> 25
ggtcagtggt tgttgataca gtgaaaggtg gcacaggtag ctttgg 46

<210> 26
<211> 46
<212> DNA
<213> artificial sequence

<220>
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<400> 26
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<210> 27
<211> 42
<212> DNA
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<220>
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<400> 27
cctaacgcag gtgctgcagg ggcagcggtt gttgataaag tg 42

<210> 28
<211> 42
<212> DNA
<213> artificial sequence

<220>
<223> Oligonucleotide

<400> 28
ctctttatca acaaccgctg cccctgcagc acctgcgtta cc 42